

*THE EFFECTS OF PRESESSION EXPOSURE TO
ATTENTION ON THE RESULTS OF ASSESSMENTS OF
ATTENTION AS A REINFORCER*

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The effects of presession exposure to attention on responding during subsequent assessments of attention as a reinforcer were evaluated across three behavioral assessments. In Experiment 1, a contingent attention assessment condition was preceded by either a noncontingent attention condition (free play) or a contingent escape condition. In Experiment 2, a diverted attention with extinction condition was preceded by either alone or a free-play condition. In Experiment 3, a two-choice preference assessment was preceded by either 10 min of free play or 10 min of playing alone. In each experiment, the participant responded differentially within the test condition according to the presence or absence of dense schedules of attention immediately prior to that condition. The results of this study show that events occurring immediately prior to an assessment condition can influence behavior within the assessment.

DESCRIPTORS: sequence effects, establishing operations, positive reinforcement, attention, functional analysis

Various forms of reinforcer assessments (DeLeon & Iwata, 1996; Fisher et al., 1992; Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997; Northup, George, Jones, Brou-

sard, & Vollmer, 1996; Pace, Ivancic, Edwards, Iwata, & Page, 1985; Wacker, Berg, Wiggins, Muldoon, & Cavanaugh, 1985; Windsor, Piché, & Locke, 1994) have been used to identify consequences that reinforce desired behaviors. Similarly, several researchers (Carr & Durand, 1985; Derby et al., 1997; Horner, Day, & Day, 1997; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994; Northup et al., 1991; Thompson, Fisher, Piazza, & Kuhn, 1998; Vollmer, Marcus, Ringdahl, & Roane, 1995) have demonstrated the clinical utility of experimental analyses for identifying the variables that maintain problem behavior. With each procedure, assessment results are analyzed by comparing a target response across or within sessions in which the presence of the hypothesized reinforcer is systematically manipulated. Consistent elevations and reductions of behavior across assessment conditions permit the identification of potential reinforcers for behavior. In some cases, however, variability in responding across or with-

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The participant for Experiment 2, Alexander, was also a participant in two studies previously published in *JABA*; however, the data in this manuscript do not overlap with the data in the previously published articles (see Peck et al., *JABA*, 29, 263–290, and McComas et al., *JABA*, 31, 287–290).

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in sessions of an assessment condition may interfere with the interpretation of the assessment results.

Variability in responding can often be attributed to changes in the arrangement of antecedent stimuli (Carr, Yarbrough, & Langdon, 1997) and to variations in the quality, amount, or immediacy of reinforcement. In some cases, however, variability in responding occurs even when antecedent conditions and the delivery of reinforcement remain constant. In these instances, fluctuations in responding may be due to changes in the organism such as the presence of an illness (Kennedy & Meyer, 1996; O'Reilly, 1997), sleep deprivation (Kennedy & Meyer, 1996; O'Reilly, 1995), medication (Northup, Fusilier, Swanson, Roane, & Borrero, 1997), or exposure to events that occurred prior to the assessment condition.

Vollmer and Iwata (1991) demonstrated that exposure to a potential reinforcer prior to an assessment condition could influence the results of a reinforcer assessment. In their study, potential reinforcers were evaluated under varying levels of satiation and deprivation for the test item with 5 men with mental retardation. For example, the effectiveness of food as a reinforcer for work behavior was evaluated immediately prior to lunch (deprivation for food) and following lunch (satiation for food). In each case, the men worked at higher rates to gain access to the reinforcer during periods of deprivation and at lower rates during periods of satiation.

Gewirtz and Baer (1958) demonstrated a similar phenomenon with social reinforcers. Young children were given verbal praise from an experimenter when they dropped a marble into a specific hole of a toy. In one condition, play began immediately upon the child's arrival to the experimental room. In the other condition, play was delayed for 20 min during which time the child sat alone without play materials. The children chose

the response that resulted in experimenter praise more often during play sessions that followed the 20 min of social deprivation than during play sessions that occurred immediately upon the child's arrival.

In each of these studies, exposure to a potential reinforcer prior to a test condition affected the results of the assessment. Iwata, Duncan, Zarcone, Lerman, and Shore (1994) and Iwata, Pace, et al. (1994) noted that the sequence of assessment conditions could influence responding within a functional analysis. One possible sequence effect is the enhancement or reduction of deprivation for the controlled consequence. For example, as described by Iwata, Pace, et al. (1994), preceding a contingent attention condition with an alone condition might enhance the establishing effects of the lean schedule of attention provided within the contingent attention condition. In contrast, exposure to a dense schedule of attention (e.g., free-play control condition) immediately prior to a contingent attention condition might mitigate the effects of the same lean schedule for attention by temporarily reducing the value of attention as a reinforcer.

O'Reilly (1999) tested this hypothesis by comparing two topographies of problem behavior (yelling and hitting) within contingent attention conditions that followed either a deprivation condition (no attention) or a satiation condition (high attention). One of the behaviors, hitting, occurred more often during analogues that followed the deprivation condition than during analogues that followed the satiation condition. These results support the concerns noted by Iwata, Duncan, Zarcone, Lerman, and Shore (1994) and Iwata, Pace, et al. (1994) that the results of a functional analysis may be influenced by the sequence of the assessment conditions for at least some behaviors.

In the current investigation, we evaluated the effects of manipulating the sequence of

Table 1
Potential Establishing Conditions and Test Conditions

Experiment	Antecedent condition (potential EO)	Test condition
1	Escape (aversive stimulation)	Contingent attention
	Free play (satiation)	Contingent attention
2	Alone (deprivation)	Diverted attention with extinction
	Free play (satiation)	Diverted attention with extinction
3	Alone (deprivation)	No attention (toys) and attention (Mom)
	Free play (satiation)	No attention (toys) and attention (Mom)

assessment conditions within three behavioral assessments for attention as a reinforcer. Our purpose was to show that the sequence of assessment conditions could have a substantial impact on the results and subsequent interpretation of distinct types of assessments of attention as a reinforcer. In Experiment 1, we examined the effects of preceding a contingent attention condition (Iwata et al., 1982/1994) with dense levels of noncontingent attention versus a contingent escape condition (see Table 1). In Experiment 2, we examined the effects of preceding a low-attention condition (diverted attention with extinction; Carr & Durand, 1985) with dense levels of noncontingent attention versus an alone condition. In Experiment 3, a two-choice preference assessment, using the procedures outlined in Harding et al. (1999), was conducted in which a child was given a choice between playing with preferred toys alone and playing with her mother without preferred toys (attention). The two-choice preference assessment was conducted under two conditions: (a) immediately following 10 min of noncontingent attention and access to preferred toys, and (b) immediately following 10 min of access to preferred toys but no attention (i.e., playing with preferred toys alone). We hypothesized that exposure to dense schedules of attention immediately prior to an assessment of attention as a reinforcer would affect target behavior within the subsequent assessment condition.

EXPERIMENT 1: NONCONTINGENT ATTENTION VERSUS CONTINGENT ESCAPE

In Experiment 1, we evaluated the effects of using different sequences of assessment conditions on the results of a functional analysis (Iwata et al., 1982/1994) of attention as a reinforcer for problem behavior. Specifically, we compared the effects of presenting a free-play condition (noncontingent attention) versus presenting a contingent escape condition immediately preceding a contingent attention condition.

METHOD

Participant and Setting

Anna was 4 years old and had been diagnosed with Rett syndrome, microcephaly, seizure disorder, neuromotor involvement with hypertonicity and ataxia, neurogenic dysphagia with aspiration, thoracolumbar scoliosis, and severe-to-profound mental retardation. She was nonverbal and did not use any manual signs or gestures to communicate. Anna lived at home with her parents and brother.

The target behavior for Anna was hand biting, which often resulted in tissue damage. Hand biting was defined as Anna inserting her hand past her lips and into her mouth. A previous A-B-C assessment and an experimental analysis of antecedent events produced inconsistent results regarding the effects of attention on hand biting.

Each phase of the investigation was conducted in Anna's preschool classroom. In addition to Anna, seven other children with moderate to profound mental disabilities, a full-time certified teacher, and two teacher associates were present in the classroom. The classroom teacher and one teacher associate served as the therapists for all phases of the evaluation.

Observation System and Interobserver Agreement

All data were collected in the classroom setting using a VHS camcorder operated by one of the investigators. Research staff later coded the videotapes using a 10-s partial-interval scoring system. A partial-interval scoring system was selected because several instances of the behavior could occur within a brief amount of time (i.e., 5 s to 10 s), and one instance of the behavior could last longer than 10 s.

Interobserver agreement checks were conducted by having two independent observers score the same section of videotape. All observers received training on the scoring procedures prior to this study. Interobserver agreement was calculated using an exact interval-by-interval scoring procedure for occurrences of target behavior. An agreement occurred when both observers independently recorded the same behavior during the same 10-s interval. Occurrence agreement was computed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Agreement checks were conducted on 33% of the sessions across all conditions. Occurrence agreement averaged 94% (range, 90% to 100%).

Experimental Design

A multielement design was used to evaluate the effects of preceding a contingent attention assessment condition with either noncontingent attention (free-play condi-

tions) or contingent escape assessment conditions within a functional analysis (Iwata *et al.*, 1982/1994). All conditions lasted 5 min. Sessions were conducted 1 to 2 days a week over a 4-week period, with no more than two condition pairs (free play/attention or escape/attention) conducted on 1 day. No pair was conducted more than once per day.

Procedure

Two types of presession assessment conditions were presented. The first condition, free play, was an analogue condition in which the teacher provided continuous attention to Anna. The classroom teacher talked to Anna as she brushed Anna's hair or as Anna played with soft rubber balls or a bead and wire toy.

The second condition, contingent escape, included the presentation of a task demand with a brief break (30 s) contingent on problem behavior. The demand consisted of the teacher placing the hairbrush in Anna's left hand and guiding Anna's hand as she brushed her hair. Any instance of self-injury resulted in a brief termination (30 s) of the task, removal of the hairbrush, and loss of teacher attention.

The test condition was a contingent attention analogue that immediately followed either the free-play or the contingent escape condition. During the contingent attention analogue, the teacher sat or stood near Anna but did not attend to her unless self-injury occurred. When self-injury occurred, the teacher immediately delivered a mild verbal reprimand (e.g., "hands down," "no biting").

RESULTS AND DISCUSSION

The results for Anna are provided in Figure 1. Hand biting occurred during an average of 6% of the intervals (range, 3% to 7%) during the contingent attention sessions that followed the free-play condition. Hand biting occurred during an average of 68% of

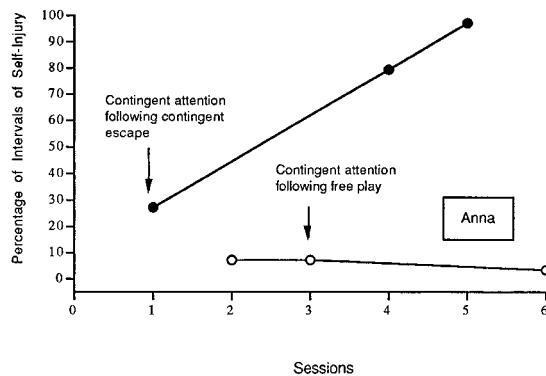


Figure 1. Percentage of intervals self-injurious behavior for Anna.

the intervals (range, 27% to 97%) during the contingent attention sessions that followed the contingent escape condition.

Anna responded differentially during the contingent attention condition depending on whether that condition was preceded by free play or contingent escape. These results provide an example of the concerns raised by Iwata, Pace, et al. (1994) that the sequence of assessment conditions may influence assessment results. The presentation of a free-play condition immediately preceding the contingent attention condition may have mitigated the effects of low levels of attention during the latter condition by reducing the value of attention as a reinforcer via satiation.

In contrast, it appears that the contingent attention conditions that followed contingent escape included both the establishing operation (deprivation of attention) and the discriminative stimulus (teacher) associated with self-injury. These results are consistent with those reported by Horner et al. (1997) and Fischer, Iwata, and Worsdell (1997) demonstrating that problem behavior occurred only when both the establishing operation and the discriminative stimulus were present within an assessment condition. It is possible that preceding the contingent attention condition with any condition other than free play would have resulted in prob-

Table 2
Percentage of Intervals of Problem Behavior for Antecedent and Test Conditions for Anna

Antecedent condition	Percentage	Target condition	Percentage
Contingent escape	7	Contingent attention	27
Free play	0	Contingent attention	7
Free play	7	Contingent attention	7
Contingent escape	0	Contingent attention	79
Contingent escape	73	Contingent attention	97
Free play	0	Contingent attention	3

lem behavior during the contingent attention condition. Preceding the contingent attention condition with an alone condition would have provided a more direct assessment of the effects of satiation versus deprivation for attention on behavior. However, it was not feasible to leave Anna unattended in the classroom setting.

Another possible explanation for the results is that they reflect a continuation of behavior from the preceding condition. If Anna engaged in high levels self-injury during the contingent escape condition, self-injury might have continued during the contingent attention condition because Anna did not discriminate the change in contingencies. To evaluate this hypothesis, we compared self-injury during the preceding free-play and contingent escape conditions to self-injury in the corresponding contingent attention condition (see Table 2).

Low percentages of self-injury occurred during all three free-play and the first two contingent escape conditions (range, 0% to 7%). Self-injury during the subsequent contingent attention conditions ranged from 3% to 7% for sessions that followed free play and 27% to 79% for sessions that followed contingent escape. With the exception of the final contingent escape/contingent attention pair, the results do not indicate that high levels of self-injury continued across assessment conditions.

In summary, Anna's results suggest that her responsiveness to contingent attention during a functional analysis was influenced by the conditions that immediately preceded the contingent attention condition, similar to the results reported by O'Reilly (1999). Thus, variability may occur because behavior is influenced by events that occur immediately prior to the assessment condition as well as by the contingencies that are provided within the assessment condition.

EXPERIMENT 2: HIGH VERSUS LOW LEVELS OF ATTENTION

In Experiment 2, we evaluated the effects of exposure to high versus low levels of attention immediately prior to a diverted attention with extinction condition for a young boy who engaged in potentially life-threatening behavior. In this experiment, the test condition was a diverted attention with extinction condition in which an adult was present in the boy's hospital room but attention was withheld for both appropriate and problem behavior (i.e., the behaviors were on extinction). This experiment was conducted to determine whether the results of an assessment that evaluated the effects of the absence of attention on behavior (a variation of the procedures described by Carr & Durand, 1985) were influenced by the sequence of assessment conditions. This procedure was selected because it allowed us to test the effects of attention on behavior without reinforcing a life-threatening behavior.

METHOD

Participant and Setting

Alexander was a 22-month-old boy with significant developmental delays and short-bowel syndrome. He had lived in the hospital since birth and had undergone several surgeries to elongate his bowel. At the time

of the investigation, Alexander did not use any spoken words, manual signs, or gestures to communicate. He had no known motor or sensory impairments, but was dependent in all self-care skills and received nutrition and medication through a gastroonomy tube and central venous line.

Alexander engaged in severe problem behavior including tantrums, gagging, and pulling and chewing on the central venous line that was used to deliver medication and nutrients. Alexander also adjusted the settings on his intravenous infusion pump (IMED) that dispensed his medications, thus upsetting the prescribed dosage of his medication. The purpose of this evaluation was to identify factors related to Alexander's pulling and chewing on his central venous line and manipulating the IMED. Pulling and chewing were defined as touching the line that ran between the central line opening and the IMED with any part of his hand or mouth for longer than 2 s. Manipulating the IMED was scored if Alexander touched the IMED with his hand for longer than 1 s.

Informal observations suggested that Alexander responded inconsistently during situations in which adults were present but provided him with little or no attention. On some occasions, Alexander played with toys or observed nurses and other medical staff when they were in his hospital room but their attention was diverted from him. On other occasions, under the same stimulus conditions, Alexander pulled on his central venous line or manipulated his IMED. He was included in this investigation to determine whether the delivery or withholding of attention immediately preceding periods of diverted attention affected his behavior within the latter condition. All phases of the assessment were conducted in Alexander's hospital room. Hospital and research staff served as therapists throughout the evaluation.

Observation System and Interobserver Agreement

Data and interobserver agreement were collected using the same procedures described for Experiment 1. A partial-interval scoring system was used because one instance of the behavior could last for the entire observation, or multiple instances of the behavior could occur within a 10-s period. Interobserver agreement checks were conducted for 52% of the sessions. Occurrence agreement was 99% (range, 95% to 100%).

Experimental Design

Pre-session exposure to continuous noncontingent attention (free-play condition) versus no attention (alone condition) was evaluated for the effects on responding during a diverted attention with extinction assessment condition within a multielement design. Diverted attention with extinction assessment sessions were preceded by either 5 min of free play or 5 min of playing alone. Sessions were conducted 1 to 2 days each week over a 3-week period. No more than two condition pairs were conducted on 1 day.

Procedure

During the free-play condition, a therapist played with Alexander and provided him with continuous noncontingent attention. In the alone condition, Alexander was left alone in his hospital room (the therapist stood outside the room out of his view). The same set of toys was available to Alexander during both conditions, and all conditions lasted 5 min.

A 5-min diverted attention with extinction condition was conducted immediately after the free-play or alone condition. During the diverted attention with extinction condition, the staff person stood next to Alexander's bed or playpen and read his chart or other reading materials but did not interact with Alexander. Problem and appropriate

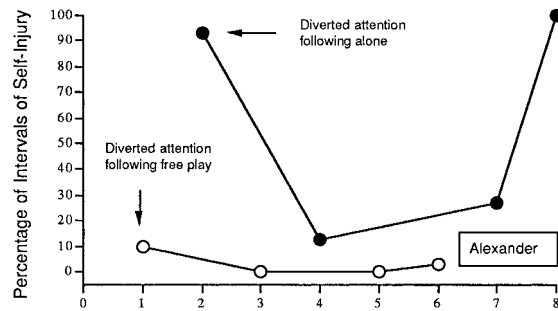


Figure 2. Percentage of intervals of self-injurious behavior for Alexander.

behaviors were placed on extinction. Alexander had access to the same group of toys that were available in the preceding condition.

For all conditions, an empty piece of tubing was taped to Alexander's abdomen and to an inactive IMED. The tube was not inserted or connected to the central venous line opening or the dispensing unit of the IMED. The false tube and inactive IMED allowed an assessment of the conditions under which Alexander would manipulate these materials without putting him at risk for infection or affecting his medication dosage. The occurrences of self-injury (pulling or chewing on the tube or manipulating the IMED) were compared across diverted attention with extinction conditions that were preceded by the free-play versus alone conditions.

RESULTS AND DISCUSSION

Alexander's behavior within the diverted attention with extinction condition varied according to whether the condition was preceded by a free-play or an alone condition (see Figure 2). When diverted attention followed 5 min of free play, problem behavior occurred for an average of 5% (range, 0% to 10%) of the intervals. When diverted attention followed the alone condition, problem behavior occurred for an average of 58% (range, 13% to 100%) of the intervals.

Data on the occurrence of problem be-

Table 3
Percentage of Intervals of Problem Behavior for
Antecedent and Test Conditions for Alexander

Antecedent condition	Percent-age	Target condition	Percent-age
Free play	0	Diverted attention	10
Alone	17	Diverted attention	93
Free play	3	Diverted attention	0
Alone	7	Diverted attention	13
Free play	0	Diverted attention	0
Free play	0	Diverted attention	3
Alone	77	Diverted attention	27
Alone	10	Diverted attention	100

havior within the two antecedent conditions and the test condition are provided in Table 3. Minimal problem behavior occurred during the free-play condition (range, 0% to 3%) and the subsequent diverted attention with extinction conditions (range, 0% to 10%). In contrast, problem behavior was variable during both the alone conditions (range, 7% to 77%) and the subsequent diverted attention with extinction conditions (range, 13% to 100%).

The variability observed in the alone conditions and the subsequent diverted attention with extinction conditions suggests that other, uncontrolled variables may have influenced Alexander's behavior in these conditions. The presence of an adult in the hospital room may not have been the only discriminative stimulus associated with receiving attention for manipulating medical equipment. During times when the tubing and IMED were active, playing with these materials while alone often resulted in medical staff entering the room and interrupting Alexander's behavior. Thus, people passing by his hospital room or the sounds of adults in the hallway may have signaled that manipulating his medical equipment was likely to result in attention. If the presence of medical staff passing through the hallway was associated with receiving attention, then both the alone and the diverted attention condi-

tions may have served as extinction conditions for attention-maintained behavior. The variability observed in both conditions may reflect the variability that is commonly observed across extinction trials.

An alternative explanation for the occurrence of problem behavior in the alone condition is that at times the equipment may have been interesting in and of itself (i.e., playing with the equipment produced automatic reinforcement). However, the purpose of this investigation was to evaluate attention as a potential reinforcer; an evaluation of the possible role of automatic reinforcement was outside the scope of this study.

Although problem behavior occurred at higher levels during the alone and subsequent diverted attention with extinction sessions, no consistent patterns of acceleration or deceleration were observed. For example, problem behavior occurred for 77% of the intervals in the third session of the alone condition and decreased to 27% of the intervals in the subsequent diverted attention with extinction session. In the fourth session of the alone condition, problem behavior occurred for only 10% of the intervals but increased to 100% of the intervals in the subsequent and final diverted attention with extinction session. These results are similar to those reported in Experiment 1.

Our findings suggest that the results of Alexander's assessment were influenced by the sequence of the assessment conditions. When access to a dense schedule of noncontingent attention preceded the test condition, very low levels of problem behavior were observed during the test condition. When the same test condition was preceded by an alone condition, higher levels of problem behavior occurred. The similar results obtained across Experiments 1 and 2 indicate that, for these participants, events that occurred immediately prior to the test con-

dition influenced behavior during the test condition for attention as a reinforcer.

EXPERIMENT 3: TWO-CHOICE PREFERENCE ASSESSMENT

In Experiments 1 and 2, we showed that assessments of attention as a potential reinforcer for problem behavior could be influenced by the sequence of the assessment conditions as suggested by Iwata, Pace, et al. (1994). Given these results, we hypothesized that other behavioral assessments of reinforcers, such as preference assessments, also might be influenced by events that immediately precede an assessment condition. In Experiment 3, we manipulated exposure to high versus low levels of attention immediately preceding a two-choice preference assessment in which the child chose between playing with a parent or playing alone with toys.

METHOD

Participant and Setting

Karen was a 4-year-old girl with moderate-to-severe mental retardation, visual impairment, and a seizure disorder. Karen had begun walking just a few months prior to the current investigation and had good control over her upper limbs. She had a vocabulary of approximately 20 words that she used on an intermittent basis to label objects. Karen lived at home with her mother and four siblings. She attended a half-day preschool program for children with mild to severe developmental delays.

Karen was initially referred for self-injury (arm biting and head slapping), screaming, and tantrums, which appeared to be maintained by negative reinforcement based on a functional analysis (Iwata et al., 1982/1994). After approximately 6 months of functional communication training, in which Karen's problem behavior was placed on escape ex-

tingtion, her mother reported that she no longer engaged in problem behaviors to escape demands, but now engaged in tantrums and biting when her mother was engaged in other activities that did not include Karen. Her mother responded to these behaviors by offering Karen preferred items (e.g., doll, book) and holding her. This report matched the observations of the research staff and suggested a positive reinforcement function for problem behavior. However, it was unclear whether attention, tangible items, or both functioned as reinforcers. A two-choice preference assessment (Harding et al., 1999) was implemented to determine whether Karen preferred gaining her mother's attention relative to gaining access to preferred toys. All assessment sessions took place in the living room of Karen's home. Her mother served as the therapist for all sessions.

Target Behavior

The dependent measure was the percentage of intervals spent with either of two concurrently available alternatives: playing with her mother or playing alone with toys. Masking tape was placed on the carpet to divide the living room in half. One half of the living room contained preferred toys; the other half included Karen's mother but no toys. "Chose Mom" was defined as the percentage of 6-s intervals during which Karen entered or remained in the side of the living room that contained her mother. The alternative response, "chose toys," was the percentage of intervals that Karen entered or remained in the side of the living room that contained a group of preferred toys. Time spent standing on the tape was scored as neutral and was not allocated to either "chose Mom" or "chose toys."

Observation System and Interobserver Agreement

All data were collected using a VHS camcorder. Research staff, using a 6-s partial-in-

terval scoring system, later coded the videotapes. For each interval, observers recorded whether Karen was present in the side of the living room that included her mother or the side that contained toys. Interobserver agreement checks were conducted in the same manner as Experiments 1 and 2. Agreement observations were conducted on 38% of the assessment sessions across all conditions. Occurrence agreement was 94% (range, 90% to 98%).

Design and Procedure

A multielement design was used to evaluate (a) Karen's preference between attention and preferred toys (Phase 1) and (b) the effects of exposure to high versus low levels of attention immediately preceding the two-choice evaluation (Phase 2). Initially, a two-choice preference assessment (Phase 1) was conducted to determine whether Karen preferred her mother's attention or preferred toys. The results of this assessment were variable. Phase 2 was conducted to evaluate the effects of dense schedules of noncontingent attention versus low levels of attention as antecedent conditions influencing Karen's selection. The evaluation was conducted over a 4-month period, with sessions conducted no more than 1 day per week. No more than two conditions were conducted per day.

During Phase 1, a piece of masking tape was placed on the living room floor to divide the room in half. A group of four to five preferred toys (identified via a group choice presentation format; Windsor *et al.*, 1994) were placed on one side of the tape. Karen's mother sat on the other side of the tape with a group of four to five items (e.g., potholders and socks) that were not typical play items for Karen. At the beginning of each choice session, the investigator stood Karen on the line of tape at the living room door and told her to play. Karen was allowed to enter either side of the room and was free to cross back and forth across the tape at any time.

If Karen entered the preferred-toy side of the room, she could play with the toys as she wished, but her mother did not interact with her. When Karen entered the attention side of the room, her mother immediately initiated interactions with Karen and maintained those interactions until Karen crossed to the preferred-toy side of the room. If Karen carried a preferred toy into the attention side of the room, an investigator took the toy and placed it back in the preferred toy area. All sessions lasted 10 min.

Following Phase 1, the second phase of the preference assessment was conducted. This assessment was conducted in the same manner, except that each session was preceded by 10 min of noncontingent attention (free-play condition) or 10 min of Karen playing with the toys alone (alone condition). During the free-play condition, Karen's mother provided continuous, noncontingent social attention as Karen played with any toy of her choice. During the 10-min alone condition, Karen again played with any toy of her choice, but her mother did not interact with her and, instead, talked with one of the investigators. The free-play and alone conditions were presented in a counterbalanced order across assessment sessions.

RESULTS AND DISCUSSION

The results for Experiment 3 are displayed in Figure 3. During the initial two-choice assessment, the percentage of intervals that Karen allocated to the attention side of the room ranged from 100% (Session 1) to 36% (Session 3) of the intervals. Similarly, the percentage of intervals allocated to playing alone with preferred toys ranged from 0 (Session 1) to 61% (Session 3).

The amount of attention provided to Karen immediately prior to the two-choice assessment was controlled during the second phase of the assessment. Karen's selections between parent attention and solitary toy

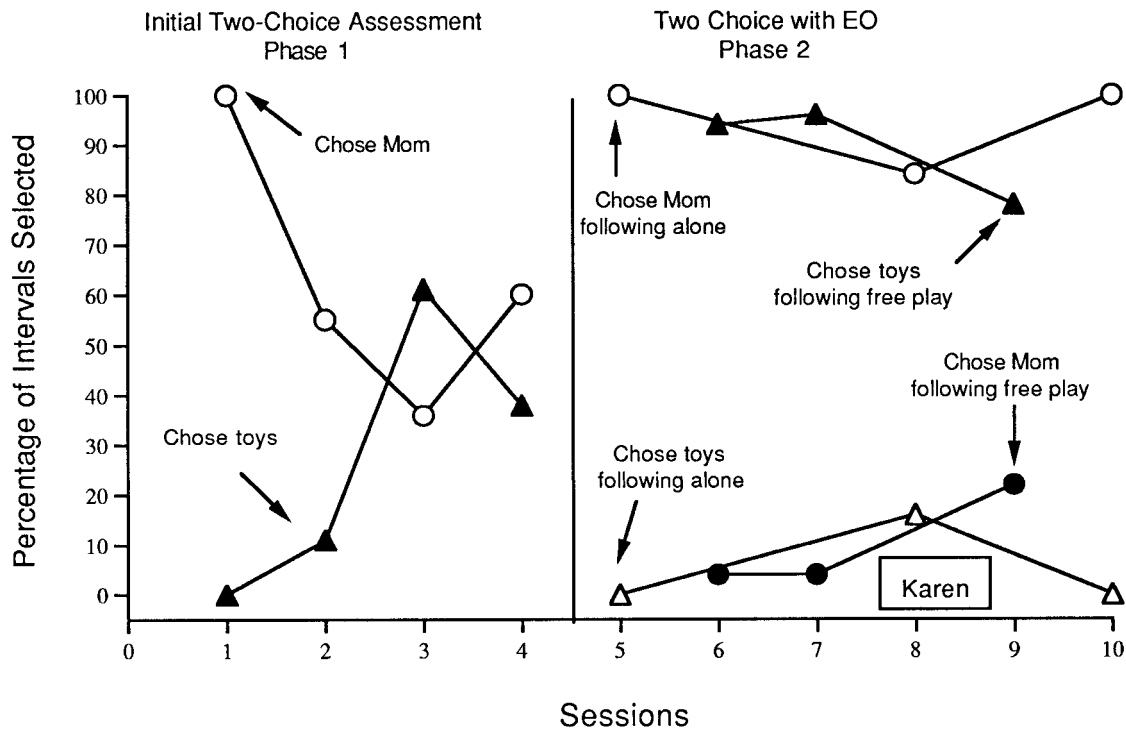


Figure 3. Percentage of intervals allocated to Mom or to preferred-toy areas for Karen. EO = establishing operations.

play varied systematically according to the condition that immediately preceded assessment. When the two-choice assessment immediately followed solitary toy play, Karen allocated most of her time to the side of the living room paired with attention (100% for Sessions 5 and 10 and 84% for Session 8). When the two-choice assessment immediately followed a period of noncontingent attention (free play), Karen spent most of her time playing with toys alone (94%, 96%, and 78% of the intervals for Sessions 6, 7, and 9, respectively).

These results demonstrate that pre-session exposure to differing levels of attention influenced Karen's preference for either attention or preferred toys in the subsequent test condition. These results show that the sequence of assessment conditions can affect the results of a two-choice preference assessment as well as assessments of problem be-

havior, at least for assessments of attention as a reinforcer.

GENERAL DISCUSSION

Pre-session exposure to attention influenced the results of three distinct assessment procedures that were designed to test the role of attention as a potential reinforcer. In Experiment 1, lower levels of problem behavior occurred during a contingent attention condition (Iwata et al., 1982/1994) when that condition was preceded by noncontingent attention than when the same condition was preceded by contingent escape. These results demonstrate that the results of an assessment can be influenced by events that immediately precede the assessment and provide support for the concerns noted by Iwata, Pace, et al. (1994) that the sequence of conditions can influence assessment results.

Although the comments of Iwata, Pace, et al. (1994) were made in regard to functional analyses of problem behavior (Iwata et al., 1982/1994), similar effects occurred with two other procedures. In Experiment 2, problem behavior was less likely to occur within a diverted attention with extinction condition when that condition was preceded by noncontingent attention than when it was preceded by an alone condition. In Experiment 3, the results of a two-choice preference assessment appeared to be influenced by the condition (play with mother or play alone) that immediately preceded the assessment session. In each of these experiments, events that occurred immediately prior to the assessment condition influenced behavior within that condition.

These presession conditions, if not controlled or considered in the analysis of the results, may make assessment results difficult to interpret because of the variability in responding that can occur across sessions of the same assessment condition. For example, if Anna's results were interpreted as individual assessment conditions, her scores within the contingent attention conditions would range from 3% to 97%. These scores, paired with the variability that occurred within the contingent escape condition (range, 0% to 73%), might have resulted in the conclusion that responding was undifferentiated across contingent escape and contingent attention conditions. Similarly, if Karen's assessment were evaluated according to the results of Phase 1, it appears that Karen failed to discriminate between the two choice options, or that preferred toys and parent attention were equally preferred.

For each assessment, conducting the evaluation within pairs of antecedent and test conditions resulted in stable and predictable patterns of performance for each child. The results of these evaluations allowed us to identify the conditions under which attention functioned as a reinforcer for behavior

(Experiments 1 and 3) or as a potential reinforcer (Experiment 2) for each child.

Iwata, Pace, et al. (1994) suggested that the sequence of assessment conditions could influence behavior because exposure to pre-session establishing operations might influence the participant's response to the establishing operations within the test condition. Michael (1982, 1993) defined establishing operations as environmental events that momentarily alter (a) the effectiveness of a reinforcer and (b) the frequency of responses associated with obtaining that reinforcer. Smith and Iwata (1997) suggested that satiation and deprivation, aversive stimulation, and variables associated with emotion could occasion variability in responding under controlled conditions in which the reinforcement contingencies remain stable.

In the current investigation, exposure to dense levels of noncontingent attention prior to the test condition may have mitigated the effects of the establishing operations that were included in the test conditions. In Experiments 1 and 3, attention was provided contingent on the target response and was withheld for alternative responses. In both experiments, the target response was less likely to occur following exposure to noncontingent attention than it was following exposure to an alternative condition (i.e., contingent escape or play alone).

In Experiment 2, exposure to noncontingent attention prior to the test condition (diverted attention with extinction) resulted in fewer occurrences of the target response than following exposure to an alone condition prior to the same test condition. Thus, satiation for attention appeared to reduce the target behavior, even though the target behavior did not result in reinforcement during the assessment conditions of Experiment 2.

If the purpose of assessment is to identify events that reinforce and maintain behavior, then it is reasonable to infer that satiation for the test item may affect responding with-

in assessment conditions. Previous research has demonstrated that presession exposure to a reinforcer may result in satiation for the item and may decrease responding in subsequent assessment sessions (O'Reilly, 1999; Vollmer & Iwata, 1991). Gewirtz and Baer (1958) demonstrated that presession deprivation from attention resulted in increased responding in a test condition. Our results showed that 3 children responded differentially to a test condition depending on the condition that immediately preceded it. These results were consistent across three separate assessment procedures. By viewing assessment results across pairs of conditions consisting of the test condition and the pre-session control condition, we may be able to better interpret undifferentiated or variable responding.

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STUDY QUESTIONS

1. What are some factors that may influence response variability during a functional analysis, even when antecedent and consequent events are held constant?
2. How might the sequence of assessment conditions influence responding? Provide an example of how functional analysis conditions may be arranged to capitalize on such sequence effects.
3. Summarize the general organization of pre-session and test conditions used in the three experiments.
4. Summarize the results of Experiment 1 and the two interpretations suggested by the data. Which interpretation did the authors find more plausible, and why?
5. How could the pre-session conditions used in Experiment 1 have been altered to provide a better evaluation of the attention condition?
6. Variability in responding was observed during both the pre-session alone conditions and the subsequent diverted attention with extinction conditions in Experiment 2, suggesting that “uncontrolled variables may have influenced Alexander’s behavior in these conditions.” Based on information provided in the text, what inadvertent source of influence may have affected Alexander’s behavior?

7. How was preference assessed in Experiment 3?
8. Summarize the general findings of the three experiments. What are the implications of these findings for the assessment and treatment of problem behavior?

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